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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/576,405	04/30/2007	Hideo Hada	SHIGA7.048APC	2382
20995 7590 10/15/2007 KNOBBE MARTENS OLSON & BEAR LLP 2040 MAIN STREET FOURTEENTH FLOOR IRVINE, CA 92614			EXAMINER EOFF, ANCA	
			ART UNIT 1795	PAPER NUMBER
			NOTIFICATION DATE 10/15/2007	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jcarter@kmob.com
eOAPilot@kmob.com

Office Action Summary

Application No.

10/576,405

Applicant(s)

HADA ET AL.

Examiner

Anca Eoff

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION:

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 04/20/2006, 04/30/2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 04/20/2006.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

1. The foreign priority documents JP 2003-363521 filed on October 23, 2003, JP 2003-410489 filed on December 9, 2003 and JP 2004-057448 filed on March 2, 2004 were received and acknowledged. However, in order to benefit of the earlier filing date, certified English translations are required.
2. Claims 1-8 are pending in the application.

Double Patenting

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 1-8 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 7-17 of copending Application No. 10/557,694 (US Pg-Pub 2007/0065748).

Although the conflicting claims are not identical, they are not patentably distinct from each other because both applications claim a photoresist composition and a method of forming a pattern using the photoresist composition, said photoresist composition comprising a resin, a combination of photoacid generators and a basic compound.

The resin comprises structural units (a1) derived from a methacrylate ester having an acid dissociable, dissolution inhibiting group, structural units (a2) derived from a (meth)acrylate ester having a lactone ring and structural units (a3) derived from a (meth)acrylate ester having a hydroxyl group. The photoacid generators are a combination of (b-0) an onium salt comprising a fluorinated alkylsulfonate and (b-1) or (b-2), said (b1) and (b2) being sulfonylimide compounds.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claim 8 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Nishimura et al. (US Pg-Pub 2002/0132181).

Claim 8 is a “product-by-process” claim.

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (MPEP 2113)

Nishimura et al. disclose a resist composition comprising an acid-dissociable group-containing resin, insoluble or scarcely soluble in alkali but becoming soluble in alkali when the acid-dissociable group dissociates and a photoacid generator (abstract). The resin could be a 2-methyl-2-adamantyl methacrylate/maleic anhydride/norbornene copolymer with a molecular weight Mw=6,300 (par.0238)

The resist composition is applied to a silicon wafer and post-baked to obtain a resist coating. The coating is exposed to radiation through a mask and is developed with tetramethylammonium hydroxide to obtain a positive-tone resist pattern (par.0224).

It is the examiner's position that the resist pattern of Nishimura et al. is identical to the resist pattern of the instant application.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 1-3 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishimura (US Pg-Pub 2002/0132181) in view of Padmanaban et al. ("Performance of Imide and methid Onium PAGs in 193 nm Resist Formulations", Proceeding of SPIE Vol 5039 (2003), pages 743-751).

With regard to claim 1, Nishimura et al. disclose a resin composition comprising:

- a resin (A) which comprises an acid-dissociable group, said resin being insoluble or scarcely soluble in alkali but becoming soluble in alkali when the acid dissociable group dissociates, and
- a photoacid generator (B) (abstract).

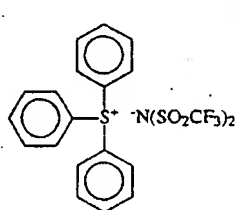
The resin (A) can be a 2-methyl-2-adamantyl methacrylate/maleic anhydride/norbornene copolymer with a molecular weight $M_w=6,300$ (par.0238). This compound is equivalent to the resin component (A) of the instant application, where the 2-methyl-2-adamantyl unit is equivalent to the structural unit (a) derived from a methacrylate ester.

Nishimura et al. disclose that the photoacid generator (B) can be used in combination with an acid generator (b), which can be an onium salt, such as triphenylsulfonium trifluoromethanesulfonate, triphenylsulfonium nonafluoro-n-butane sulfonate and triphenylsulfonium perfluoro n-octanesulfonate (par.0135, par.0138 and par.0145-0147).

However, Nishimura et al. do not disclose that the acid generator (b) has the structure represented by the formula (b-1) or (b-2) as required by the instant application.

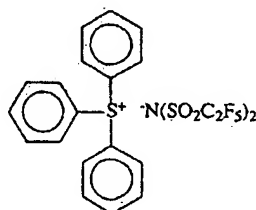
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Padmanaban et al. disclose a composition comprising copolymers such as 2-methyl-2-adamantyl methacrylate/mevalonic lactone methacrylate (MAdMA/MLMA) or 2-methyl-2-adamantyl methacrylate/maleic anhydride/norbornene-2-carboxylate/g-butyrolactone methacrylate (BNC/MA/MAdMA/GBLMA) and acid generators, such as TPSNC-1, TPSCNC-2, TPSCNC-4 (see table 1 on page 747), wherein the acid generators TPSCNC-1, TPSCNC-2, TPSCNC-4 are represented by the formulas (I)-(III):



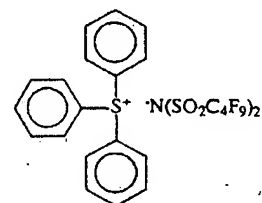
TPSNC1

(I)



TPSNC2

(II)



TPSNC4

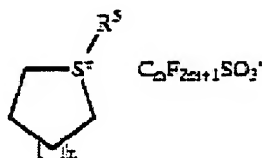
(III)

The acid generators TPSCNC-1, TPSCNC-2, TPSCNC-4 are equivalent to the acid generator of formula (b-2) of the instant application, where R^1 , R^2 , R^3 are phenyl groups and Y,Z are fluorinated alkyl groups with 1-4 carbon atoms.

TPSCNC-4 shows the best performance in term of resolution and exposure latitude and I-D bias. The PEB (post-exposure bake) sensitivity of TPSCNC-4 was compared to that of triphenylsulfonium triflate/trifluoromethane sulfonate, triphenylsulfonium nonaflate/perfluorobutane sulfonate and triphenylsulfonium perfluorooctane sulfonate and it was found that TPSCNC-4 has a better PEB sensitivity than triphenylsulfonium nonaflate, triphenylsulfonium triflate (page 749, par. 3.5. and fig 8 on page 750).

Since TPSCNC-4 performs well as acid generator in compositions comprising resins with methacrylate units and has a better PEB sensitivity than triphenylsulfonium triflate/trifluoromethane sulfonate and triphenylsulfonium nonaflate/perfluorobutane sulfonate, it would have been obvious for one of ordinary skill in the art at the time of the invention to use TPSCNC-4 disclosed by Padmanaban et al. as acid generator (b) in the composition of Nishimura et al., with a reasonable expectation of success.

With regard to claim 2, Nishimura et al. further disclose that the acid generator (B) is a compound comprising a straight chain fluorinated alkylsulfonate anion, such as the compound represented by the formula (IV):



(IV) (formula (3) in the abstract, where m is 1 to 8).

With regard to claim 3, the resin (A) can be a 2-methyl-2-adamantyl methacrylate/maleic anhydride/norbornene copolymer with a molecular weight $M_w=6,300$ (par.0238). This compound is equivalent to the resin component (A) of the instant application, where the 2-methyl-2-adamantyl unit is equivalent to the structural unit (a1) derived from a methacrylate ester comprising an acid dissociable, dissolution inhibiting group.

With regard to claim 6, Nishimura et al. further disclose that the composition comprises a nitrogen-containing compound (par.0179).

With regard to claims 7-8, Nishimura et al. disclose a resist pattern and a method for forming a resist pattern, said method comprising the following steps:

- applying the resin composition to substrates (par.0205);
- optionally pre-baking (par.0205);
- exposing to form a predetermined pattern (par.0205)
- developing to form a predetermined pattern (par.0208), wherein the developer used in the developing step is an alkaline aqueous solution (par.0209).

9. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uetani et al. (US Pg-Pub 2001/0014428) in view of Hatakeyama et al. (US Pg_pub 2002/0207201)

With regard to claim 1, Uetani et al. disclose a chemically amplified positive resist composition comprising a resin (X) which is insoluble or slightly soluble in alkali but becomes soluble in alkali due to the action of an acid and an acid generating agent (Y) (abstract).

Specific examples of resin (X) are copolymers of 2-methyl-2-adamantyl methacrylate/3,5-dihydroxy-1-adamantyl methacrylate/ α -methacryloyloxy- γ -butyrolactone with Mw=7,100 (par.0098) and 2-ethyl-2-adamantyl methacrylate/3,5-dihydroxy-1-adamantyl methacrylate/ α -methacryloyloxy- γ -butyrolactone with Mw=5,600 (par.0099).

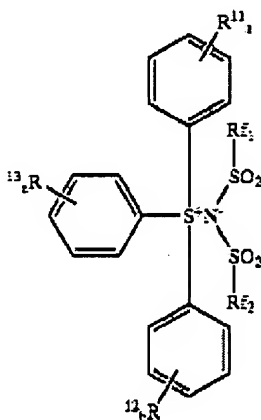
The resin (X) is equivalent to the resin component (A) of the instant application, comprising structural units (a) derived from a (meth)acrylate ester.

Uetani et al. further disclose that the acid generator can be an onium compound (par.0030) but fail to include sulfonium compounds such as the compounds of formula (b-1) or (b-2) of the instant application as sulfonium compounds used as acid generators in the chemically amplified resist composition.

Hatakeyama et al. disclose a chemically amplified positive resist material comprising a base resin and an acid generator, wherein the acid generator has high sensitivity and high resolution with respect to high-energy rays of 300 nm or less (abstract).

The base resin can be a polymer comprising units derived from (meth)acrylate ester comprising acid-dissociable groups and units derived from (meth)acrylate ester comprising lactone-containing mono- and bicyclic groups (see polymers 1-4 in par.0165).

The acid generator can be a compound represented by the formula (IV):



(IV) (par.0030), with the substituents R_{f1}, R_{f2} defined in par.0024 and the substituents R¹¹, R¹² and R¹³ defined in par.0031.

Specific examples of acid generator of the formula (IV) above are PAG-1, PAG-5 to PAG-8 in par.0163.

The acid generators PAG-1 and PAG 5-8 are equivalent to the acid generator of formula (b-2) of the instant application, where R^1 , R^2 , R^3 are phenyl groups and Y,Z are fluorinated alkyl groups with 1-4 carbon atoms.

The resist materials of Hatakeyama et al. have good sensitivity, resolution, line-edge roughness and I/G bias (par.0185).

Since the photoacid generator of Hatakeyama et al. is successfully used for chemically amplified resist comprising resins such as methacrylate copolymers and since Uetani et al. indicate the use of onium acid generators in its composition, it would have been obvious for one of ordinary skill in the art at the time of the invention to use the acid generators of formula (IV) as disclosed by Hatakeyama et al. in the chemically amplified positive resist composition of Uetani et al., with a reasonable expectation of success.

With regard to claim 2, Hatakeyama et al. further disclose that an acid generator, different from the one of described above can be added to the composition and indicates a series of compounds comprising as anion a fluoroalkylsulfonate (par.0090).

With regard to claims 3-5, Uetani et al. disclose the 2-methyl-2-adamantyl methacrylate/3,5-dihydroxy-1-adamantyl methacrylate/ α -methacryloyloxy- γ -butyrolactone copolymer with $M_w=7,100$ (par.0098), wherein;

- the 2-methyl-2-adamantyl unit is equivalent to the structural unit (a1) derived from a methacrylate ester comprising an acid dissociable group;

- the α -methacryloyloxy- γ -butyrolactone unit is equivalent to the structural unit (a2) derived from a methacrylate ester comprising a lactone-containing monocyclic group;

- the 3,5-dihydroxy-1-adamantyl methacrylate unit is equivalent to the structural unit (a3) derived from a methacrylate ester comprising a polar-group containing aliphatic hydrocarbon group.

With regard to claim 6, Uetani et al. further disclose that the chemically amplified resist composition comprises a basic nitrogen-containing compound (par.0089).

With regard to claims 7-8, Uetani et al. further disclose a method of forming a pattern, comprising the following steps;

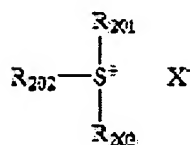
- applying the resist solution on a wafer by spin-coating (par.0106)
- pre-baking (par.0106);
- irradiating with an ArF excimer stepper through a line-and-space pattern (par.0107);
- subjecting the exposed wafer to post-exposure baking (par.0107);
- developing with an aqueous tetramethylammonium hydroxide solution, to obtain a developed pattern.(par.0107).

10. Claims 1 and 3-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kodama et al. (US Pg-Pub 2005/0095532) in view of Padmanaban et al. ("Performance of Imide and methid Onium PAGs in 193 nm Resist Formulations", Proceeding of SPIE Vol 5039 (2003), pages 743-751).

With regard to claim 1, Kodama et al. disclose a positive working resist composition comprising A) a compound capable of generating an acid by irradiation with actinic ray and B) a resin which is decomposed by the action of an acid, whereby its solubility in an alkaline developer increases (par.0094).

Kodama et al. give specific examples of resin B), such as (meth)acrylate ester copolymers with molecular weights of no more than 8,000 (resins shown in examples (27), (28) (29), (31) in par.0646).

Kodama et al. give specific examples of acid generator A) in par.0192 and further disclose that a compound of formula (V) can be used together with the acid generator A):



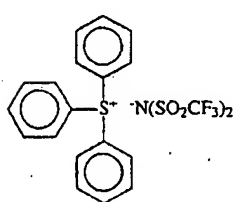
(V) (formula ZI in par.0202), where R_{201} , R_{202} , R_{203} are organic groups (par.0203) and X^{-} is a non-nucleophilic anion, such as a bis(alkylsulfonyl)imide anion in which the alkyl group is substituted with fluorine atom.

However, Kodama et al. do not give specific examples of compounds of formula (V) having bis(alkylsulfonyl)imide anions in which the alkyl group is substituted with fluorine atom.

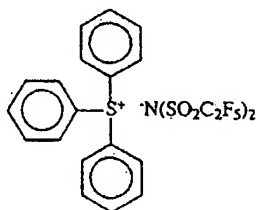
Padmanaban et al. disclose a composition comprising copolymers such as 2-methyl-2-adamantyl methacrylate/mevalonic lactone methacrylate (MAdMA/MLMA) or

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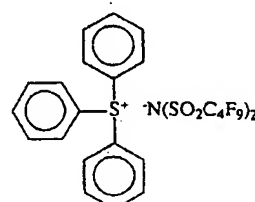
2-methyl-2-adamantyl methacrylate/maleic anhydride/norbornene-2-carboxylate/g-butyrolactone methacrylate (BNC/MA/MAdMA/GBLMA) and acid generators, such as TPSNC-1, TPSCNC-2, TPSCNC-4 (see table 1 on page 747), wherein the acid generators TPSCNC-1, TPSCNC-2, TPSCNC-4 are represented by the formulas (I)-(III):

**TPSNC1**

(I)

**TPSNC2**

(II)

**TPSNC4**

(III)

The acid generators TPSCNC-1, TPSCNC-2, TPSCNC-4 are equivalent to the acid generator of formula (b-2) of the instant application, where R^1 , R^2 , R^3 are phenyl groups and Y,Z are fluorinated alkyl groups with 1-4 carbon atoms.

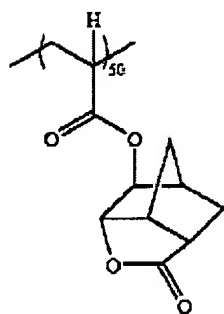
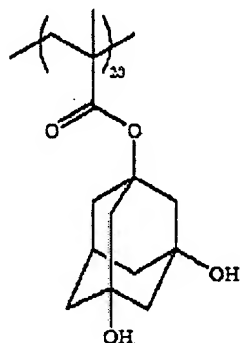
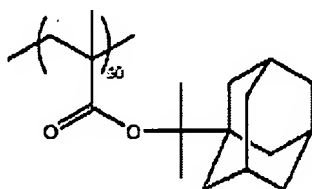
TPSCNC-4 shows the best performance in term of resolution and exposure latitude and I-D bias and good PEB (post-exposure bake) sensitivity (page 749, par. 3.5. and fig 8 on page 750).

Since TPSCNC-4 performs well as acid generator in composition comprising methacrylate units, has a good PEB sensitivity and satisfies the requirement for an acid generator of formula (V) for the composition of Kodama et al., it would have been obvious for one of ordinary skill in the art at the time of the invention to use TPSCNC-4

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disclosed by Padmanaban et al. in the composition of Kodama et al., with a reasonable expectation of success.

With regard to claims 3-5, Kodama et al. further disclose the resin comprising the units below (Resin in example (29) in par.0646):



The first unit is equivalent to the structural unit (a1) derived from a methacrylate ester comprising an acid dissociable group;

The third unit is equivalent to the structural unit (a2) derived from an acrylate ester comprising a lactone-containing monocyclic group;

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The second unit is equivalent to the structural unit (a3) derived from a methacrylate ester comprising a polar-group containing aliphatic hydrocarbon group.

With regard to claim 6, Kodama et al. further disclose that the positive resist composition comprises a nitrogen-containing basic compound (par.0570-0574).

With regard to claims 7-8, Kodama et al. disclose a pattern and a method of forming a pattern, said method comprising the following steps:

- uniformly coating the resist composition on a silicon substrate to form a film (par.0751);
- irradiating the resist film by an electron beam projection lithography device (par.0752);
- developing with an aqueous solution of tetramethylammonium hydroxide to form a hole pattern (par.0752).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anca Eoff whose telephone number is 571-272-9810.

The examiner can normally be reached on Monday-Friday, 6:30 AM-4:00 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

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published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

COMMUNICATIONS SECTION
JUL 1 2011
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10/576,405

AE *AE*

Cynthia Kelly